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Assessment of the antioxidant properties of micellar spice extracts by galvanostatic coulometry with electrogenerated hexacyanoferrate(III) ions

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Abstract

© 2015, Pleiades Publishing, Ltd. The stoichiometric coefficients of reactions of individual antioxidants of spices—rutin; quercetin; eugenol; curcumin; capsaicin; thymol; tannin; catechol; and gallic, p-coumaric, caffeic, chlorogenic, and rosmarinic acids—with electrogenerated hexacyanoferrate(III) ions in a Triton X100 micellar medium are determined; the corresponding reaction schemes are proposed. It is found that the maximum recovery of active components from spices is achieved at a single extraction with a 0.25 mM Triton X100 solution for 10 min upon sonication. The raw material: extractant ratio is 1: 30 for all spices except for caraway, red sweet pepper, and nutmeg (1: 40) and cumin and red pepper (1: 20). The ferric reducing power (FRP) of micellar extracts of 16 spices is evaluated. It is found that the highest FRP is characteristic for cinnamon and clove (122 ± 4 and 106 ± 6 C/g, respectively), while the lowest value of this parameter is typical for cumin and turmeric (3.3 ± 0.3 and 2.5 ± 0.3 C/g, respectively), which is because of the nature of the active components of spices and the extractant. The FRP of spices correlates with their antiradical activity and the total phenolic content with r = 0.9714 and 0.9936, respectively.

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Keywords

antioxidant properties, ferric reducing power, food analysis, galvanostatic coulometry, micellar media, spices, surfactants